

# Opportunities for Beryllium Health and Safety Research by Type of Research

*Estimated Cost in  
\$M per Year*

## **Applied**

Total for Applied

5.000

### Exposure

Develop sampling methods that characterize beryllium particulate exposure by mass, number, size fraction, chemical form, particle surface area.	1
Identify or develop a high volume personal pump.	0.1
Use of improved methods (e.g., sampling by mass, number, size fraction, chemical form, particle surface area and using real-time and nanogram analysis) to better characterize exposure risks in current DOE operations.	0.1
Develop sampling methods that characterize fine and ultra-fine beryllium particulate exposure.	0.4
Develop standardized and validated sampling methods for uncommon surfaces and relevant media.	0.5
Develop a method for quantifying skin and mucous membrane exposure.	0.5
Develop promising near real-time monitoring instruments or sampling and analytical methods.	1.15

### Controls

Develop a coating technology to mitigate particulate aerosol releases from surfaces.	0.25
Determine the relationship between surface contamination and health risk.	0.5
Develop improved engineering and administrative controls having DOE-wide application for beryllium operations, maintenance and construction activities.	0.5

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## **Basic**

Total for Basic 5.850

### Health Effects

Develop and validate improved screening and diagnostic tests, including the identification of genetic factors that relate to risk.	2.25
Define the natural history of beryllium disease.	0.05
Characterize and determine the health significance of the physiochemical properties of beryllium.	1.25
Determine the bioavailability of beryllium at different locations in the body; the health impacts at those locations and the impact on remote organ systems.	
Establish standard clinical definitions and protocols for determining sensitization and disease.	0.05
Develop in-vitro and in-vivo technologies for detecting beryllium in tissue.	0.5
Develop an animal that models human CBD by contracting the disease after exposure to beryllium.	0.5
Develop a human cell line that responds to beryllium.	0.5
Identify opportunities for therapeutic interventions (pre-CBD) or specific therapies for CBD.	0.75

## **Epidemiology**

Total for Epidemiology 3.750

### Exposure

Determine the types of exposures that are generated by different types of activities.	0.5
Determine which exposure parameters correlate with each other at different times and workplaces.	0.25
Establish the availability of aerosol and particle standard reference materials.	0.1

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Develop and validate analytic methods sensitive to the 0.1 nanogram per sample level of quantitation.	0.25
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## Health Effects

Determine effective means for communicating beryllium risk.	0.05
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Determine the dose-response relationship for beryllium sensitization and disease for different exposure parameters, i.e., mass, number, size fraction, chemical form, particle surface area.	0.75
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Determine the prevalence of sensitization and disease in the public. Include support personnel around beryllium operations. Consider smoking. Include natural and other non-occupational exposures.	0.5
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Identify biomarkers of exposure such as molecules in serum that indicate exposure, sensitivity, disease.	0.5
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Develop a nationwide tissue repository (library) of samples obtained from beryllium sensitized and diseased patients.	0.5
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Develop a nationwide beryllium registry for all sensitized and CBD individuals.	0.25
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Determine the natural history of beryllium disease: sensitization to disease; different rates of progression; workers and public; include non-occupational exposures; risk factors e.g., genetics, underlying disease, gender, age, smoking.	0.1
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<b>Total:</b>	<b>14.600</b>
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